SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

2102-F-21-R-41

Name: West Oakwood Lake **County**: Brookings
Legal Description: T111N- R51W-Sec. 1, 3, 5-8, 12, 32, 36
Location from nearest town: 5 miles west of Bruce, SD.

Dates of present survey: July 28-30, 2008
Date last surveyed: July 31, 2006-August 2, 2006

Primary Game and Forage Species	Other Species
Walleye	Northern Pike
Yellow Perch	Bigmouth Buffalo
.	Carp
	White Sucker
	Black Bullhead

PHYSICAL DATA

Surface Area: 1,200 acres
Maximum depth: 10 feet
Volume: No data
Contour map available: Yes
OHWM elevation: 1626.9
Outlet elevation: 1626.4
Watershed: 43,363 acres
Mean depth: 6 feet
Shoreline length: No data
Date mapped: 1964
Date set: October, 1981
Date set: October, 1981
Lake elevation observed during the survey: 0.5 feet low
Beneficial use classifications: (5) warmwater semi-permanent fish propagation, (7) immersion recreation, (8) limited-contact recreation and (9) fish and wildlife propagation and stock watering.

Introduction

The Oakwood Lakes complex derived its name from the numerous oak trees found in the area. East Oakwood Lake was originally named Oakwood Lake while West Oakwood was originally known as Lake Tetonkaha.

Ownership of Lake and Adjacent Lakeshore Property

West Oakwood is listed as a meandered lake in the State of South Dakota Listing of Meandered Lakes and the South Dakota Department of Game, Fish and Parks (GFP) manages the fishery. Much of the north and east shoreline is owned and managed by GFP as a Game Production Area and the Oakwood Lake State Recreation Area. The remainder of the shoreline is privately owned.

Fishing Access

Oakwood Lake State Recreation Area contains a two-lane boat ramp, dock, parking lot, public toilets, modern campground, and a handicapped-accessible fishing dock. Shore fishing sites are easily found throughout the area.

Field Observations of Water Quality and Aquatic Vegetation

The Secchi depth measurement was 71 cm (28 in) during the survey. Scattered stands of common cattail (*Typha spp.*) and bulrush (*Scirpus spp.*) were observed around the lake.

Winterkill History

1977-1978	Severe winterkill
1980	Aeration system installed by Oakwood Lakes Association
1981-1982	Poor oxygen levels recorded but no winterkill occurred
1990-1994	Somewhere in this time period a partial winterkill occurred
1996-1997	Severe winterkill
2000-2001	Severe winterkill

BIOLOGICAL DATA

Methods:

West Oakwood Lake was sampled on July 28-30, 2008 with three overnight gill net sets and 10 overnight trap net sets. The trap nets are constructed with 19-mm-bar-mesh (¾ in) netting, 0.9 m high x 1.5 m wide (3 ft high x 5 ft wide) frames and 18.3 m (60 ft) long leads. The gill nets are 45.7 m long x 1.8 m deep (150 ft long x 6 ft deep) with one 7.6 m (25 ft) panel each of 13, 19, 25, 32, 38 and 51-mm-bar-mesh (½, ¾, 1, 1¼, 1½, and 2 in) monofilament netting. Gill-net and trap-net sites are displayed in Figure 4.

Results and Discussion:

Gill Net Catch

Yellow perch (32.8%), walleye (28.9%), and white suckers (14.7%) were the most abundant species sampled in the gill nets (Table 1). Lesser numbers of common carp, bigmouth buffalo, black bullhead, and northern pike were also caught.

Table 1. Total catch from three overnight gill net sets at West Oakwood Lake, Brookings County, July 28-30, 2008.

Species	Number	Percent	CPUE[1]	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Yellow Perch	76	32.8	25.3	±6.0	63.6	57	9	104
Walleye	67	28.9	22.3	±11.5	25.6	17	0	90
White Sucker	34	14.7	11.3	±5.0	6.3	88	71	96
Common Carp	25	10.8	8.3	±2.3	21.7	96	16	90
Bigmouth Buffalo	18	7.8	6.0	±7.1	1.4	0	0	101
Black Bullhead	10	4.3	3.3	±3.1	90.5	--	--	89
Northern Pike	2	0.9	0.7	±0.4	2.6	--	--	--

* 5 years (1998, 2000, 2002, 2004, 2006)

Trap Net Catch

Black bullheads comprised 93.4% of the trap net sample (Table 2). The remainder of the catch consisted of common carp, bigmouth buffalo, white sucker, yellow perch, walleye, and northern pike.

Table 2. Total catch from 10 overnight trap net sets at West Oakwood Lake, Brookings County, July 28-30, 2008.

Species	Number	Percent	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Black Bullhead	1,967	93.4	196.7	±126.9	849.7	6	0	83
Common Carp	38	1.8	3.8	±1.6	36.3	89	7	90
Bigmouth Buffalo	31	1.5	3.1	±0.9	2.1	81	19	94
White Sucker	24	1.1	2.4	±1.1	7.1	100	100	93
Yellow Perch	23	1.1	2.3	±0.9	4.9	52	0	92
Walleye	18	0.9	1.8	±3.7	5.7	11	0	86
Northern Pike	4	0.2	0.4	±0.2	1.1	--	--	--

* 5 years (1998, 2000, 2002, 2004, 2006)

Walleye

Management objective: To maintain a walleye population with a gill-net CPUE of at least 15, 25 cm (10 in) or longer fish in three out of five lake surveys.

Over 50% of the walleyes sampled this year were naturally-produced, young-of-the-year (YOY) fish that were 10-15 cm (4-6 in) long (Figure 1). CPUE for age-1+ fish was about 12 and these fish were 28-33 cm (11-13 in) long. The establishment of a consistent, high-quality walleye fishery in West Oakwood has been difficult due to periodic winterkills.

[1] See Appendix A for definitions of CPUE, PSD, and mean Wr.

Table 3. Walleye gill-net CPUE, PSD, RSD-P and mean Wr for West Oakwood Lake, Brookings County, 1999-2008.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
CPUE		9.7		5.0		9.0		62.0		22.3
PSD		63		0		100		29		17
RSD-P		22		0		0		0		0
Mean Wr		90		102		91		95		90

Yellow Perch

Management objective: To maintain a yellow perch population with a gill-net CPUE of at least 25, 13 cm (5 in) or longer fish in three out of five lake surveys.

Yellow perch gill-net CPUE declined substantially from the three preceding surveys (Table 4). The wide range in length of fish sampled (68-280 mm or 2.7-11.0 in) indicate relatively consistent annual natural production (Figure 2).

Table 4. Yellow perch gill-net CPUE, PSD, and mean Wr for West Oakwood Lake, Brookings County, 1999-2008.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
CPUE		10.7		75.0		70.5		82.0		25.3
PSD		12		6		38		45		57
RSD-P		0		1		34		3		9
Mean Wr		95		108		95		97		104

Black Bullhead

Management objective: To maintain a black bullhead population with a trap-net CPUE of less than 100, 15 cm (6 in) or longer fish in three out of five lake surveys.

Black bullhead trap net CPUE has been slowly decreasing since 2000 (Table 5). No large year classes have been recently produced and high mortality has resulted in lower abundance and smaller fish (Figure 3) (Table 5). West Oakwood bullheads grow to a maximum length of about 25 cm (10 in) and apparently die of natural causes.

Table 5. Black bullhead trap-net CPUE, PSD and RSD-P for West Oakwood Lake, Brookings County, 1999-2008.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
CPUE		1345.4		1170.0		935.3		300.4		196.7
PSD		2		54		1		27		6
RSD-P		0		0		0		0		0
Mean Wr						75		97		83
Mean Length (mm)						184		179		159

All Species

Northern pike, common carp, and black bullhead abundance is below the long term average (Table 6). Other species are within previously observed ranges.

Table 6. Gill-net (GN) and trap-net (TN) CPUE for all fish species sampled in West Oakwood Lake, Brookings County, 1999-2008.

Species	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
COC (GN)		10.7		36.7		15.0		10.0		8.3
COC (TN)		10.3		24.9		9.6		13.8		3.8
WHS (GN)		3.0		10.0		7.0		5.5		11.3
WHS (TN)		4.1		11.5		10.8		2.8		2.4
BIB (GN)		4.3		0.3		1.0		1.5		6.0
BIB (TN)		3.2		0.4		3.5		1.6		3.1
BLB (GN)		136.7		72.0		159.5		24.0		3.3
BLB (TN)		1,345.4		1,170.0		935.3		300.4		196.7
YEB (GN)		--		--		--		--		--
YEB (TN)		--		--		0.2		--		0.2
NOP (GN)		2.3		2.0		4.5		2.5		0.7
NOP (TN)		1.1		1.5		0.7		0.4		0.4
WHB (GN)		--		--		--		--		--
WHB (TN)		--		--		0.1		--		--
OSF (GN)		--		--		0.5		--		--
OSF (TN)		--		--		--		--		--
YEP (GN)		10.7		75.0		70.5		82.0		25.3
YEP (TN)		0.4		0.1		4.4		10.7		2.3
WAE (GN)		9.7		8.3		9.0		62.0		22.3
WAE (TN)		3.6		0.3		7.6		13.5		1.8

COC (Common Carp), WHS (White Sucker), BIB (Bigmouth Buffalo), BLB (Black Bullhead), YEB (Yellow Bullhead), NOP (Northern Pike), WHB (White Bass), OSF (Orange-spotted Sunfish), YEP (Yellow Perch), WAE (Walleye).

MANAGEMENT RECOMMENDATIONS

1. Stock walleye fry or fingerlings after winterkill to reestablish the population and as needed to accomplish the management objective.

2. Stock yellow perch fry, fingerlings or adults after a winterkill to reestablish the population and as needed to accomplish the management objective.

3. Accomplish the black bullhead management objective by maintaining walleye abundance and by commercial fishing when fish in the population are large enough to be marketed.

4. Monitor the West Oakwood fishery by continuing to conduct lake surveys every other year.

Table 7. Stocking record for West Oakwood Lake, Brookings County, 1990-2008.

Year	Number	Species	Size
1990	38,016	Yellow Perch	Fingerling
1991	21,370	Yellow Perch	Fingerling
	2,030	Walleye	Lrg. Fingerling
	788	Walleye	Fingerling
1992	60,000	Northern Pike	Fingerling
	29,900	Largemouth Bass	Med. Fingerling
1993	1,200,000	Walleye	Fry
1994	132,700	Saugeye	Sml. Fingerling
	17,020	Yellow Perch	Juvenile
	4,082	Yellow Perch	Adult
1997	220,000	Walleye	Fingerling
1999	1,200,000	Walleye	Fry
2001	79,300	Walleye	Fingerling
	12,221	Yellow Perch	Adult
2004	119,100	Walleye	Fingerling
2006	1,201,589	Walleye	Fry

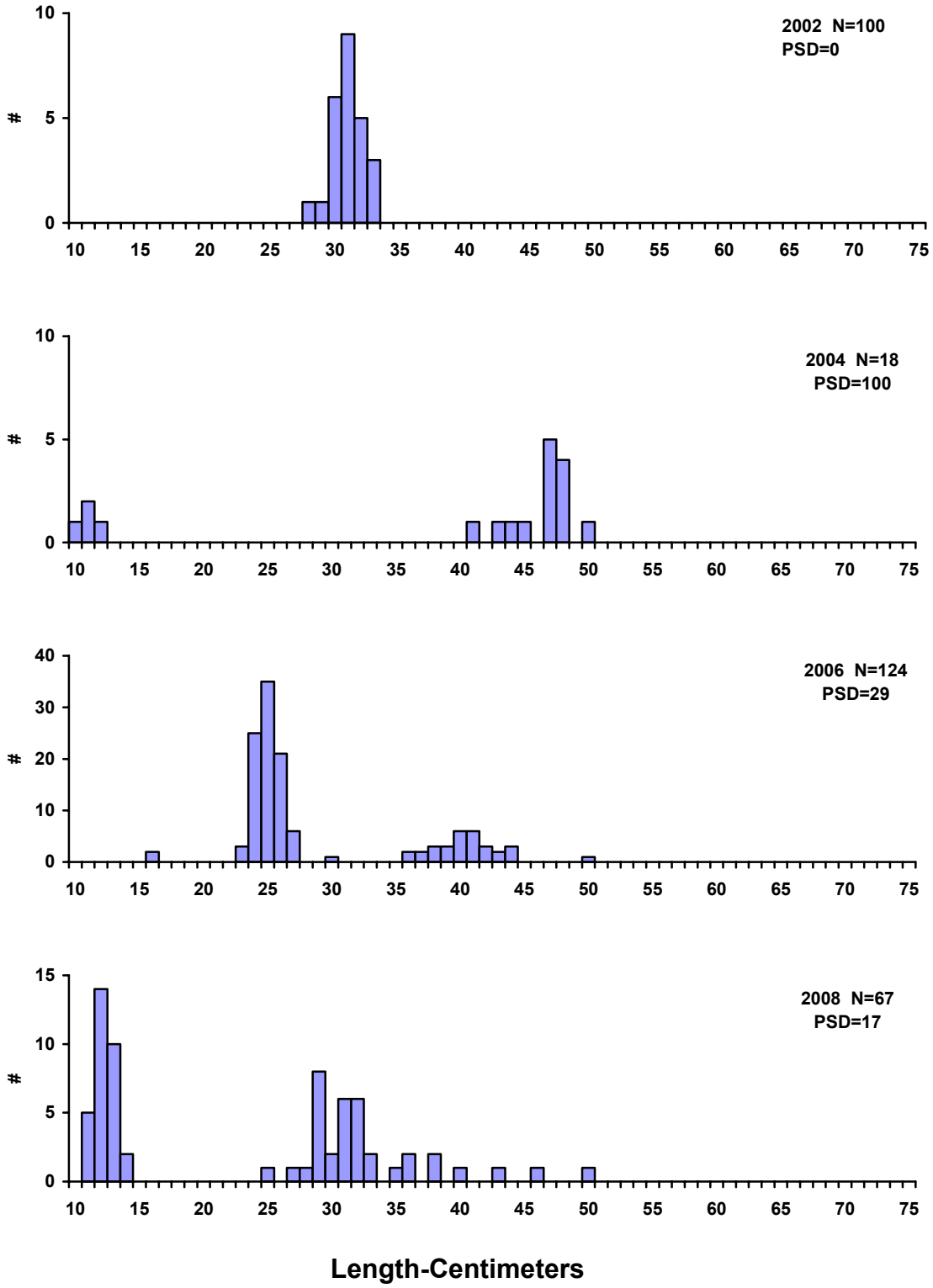

Figure 1. Length frequency histograms for walleyes sampled with gill nets in West Oakwood Lake, Brookings County, 2002, 2004, 2006, and 2008.

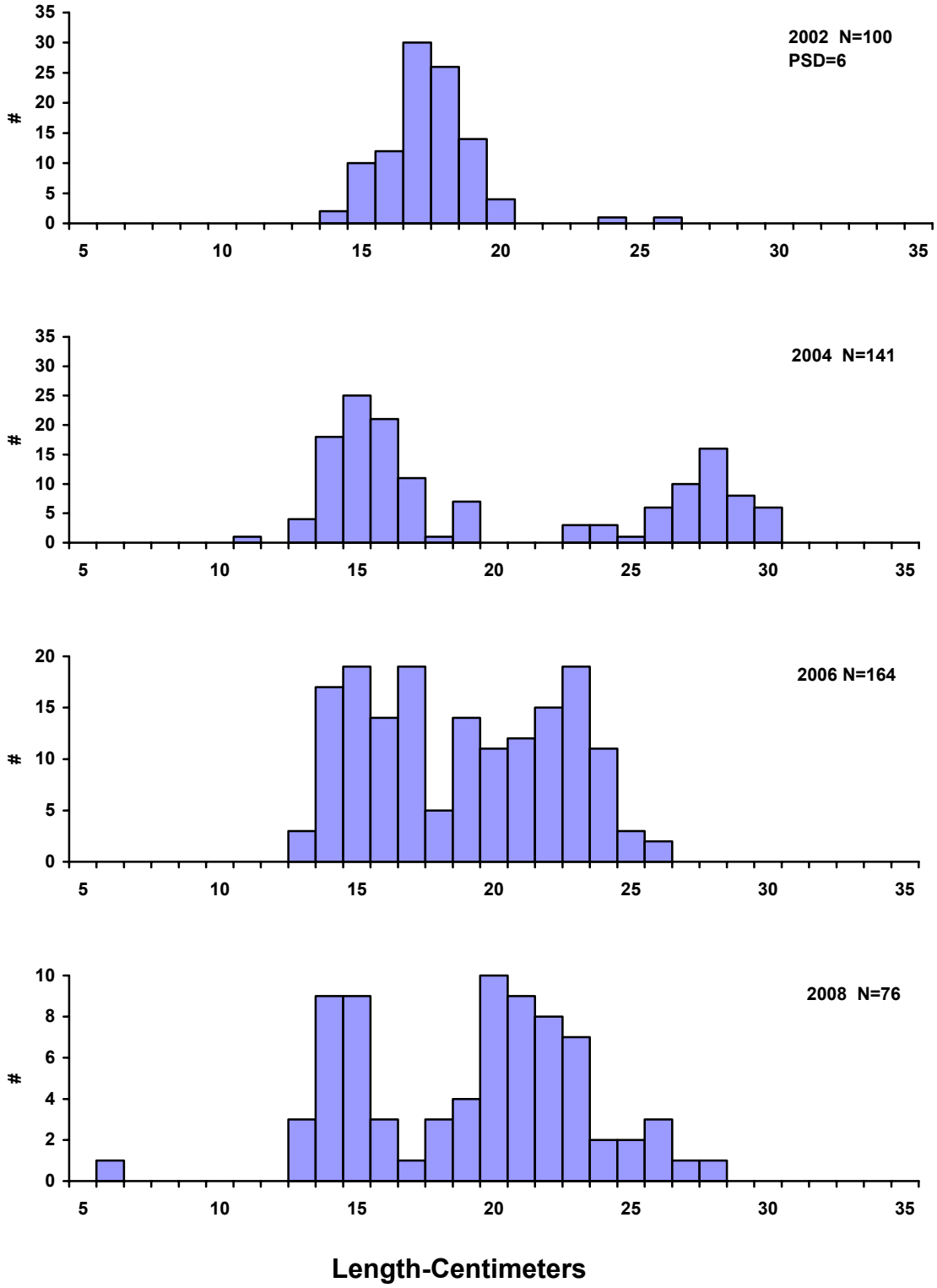

Figure 2. Length frequency histograms for yellow perch sampled with gill nets in West Oakwood Lake, Brookings County, 2002, 2004, 2006, and 2008.

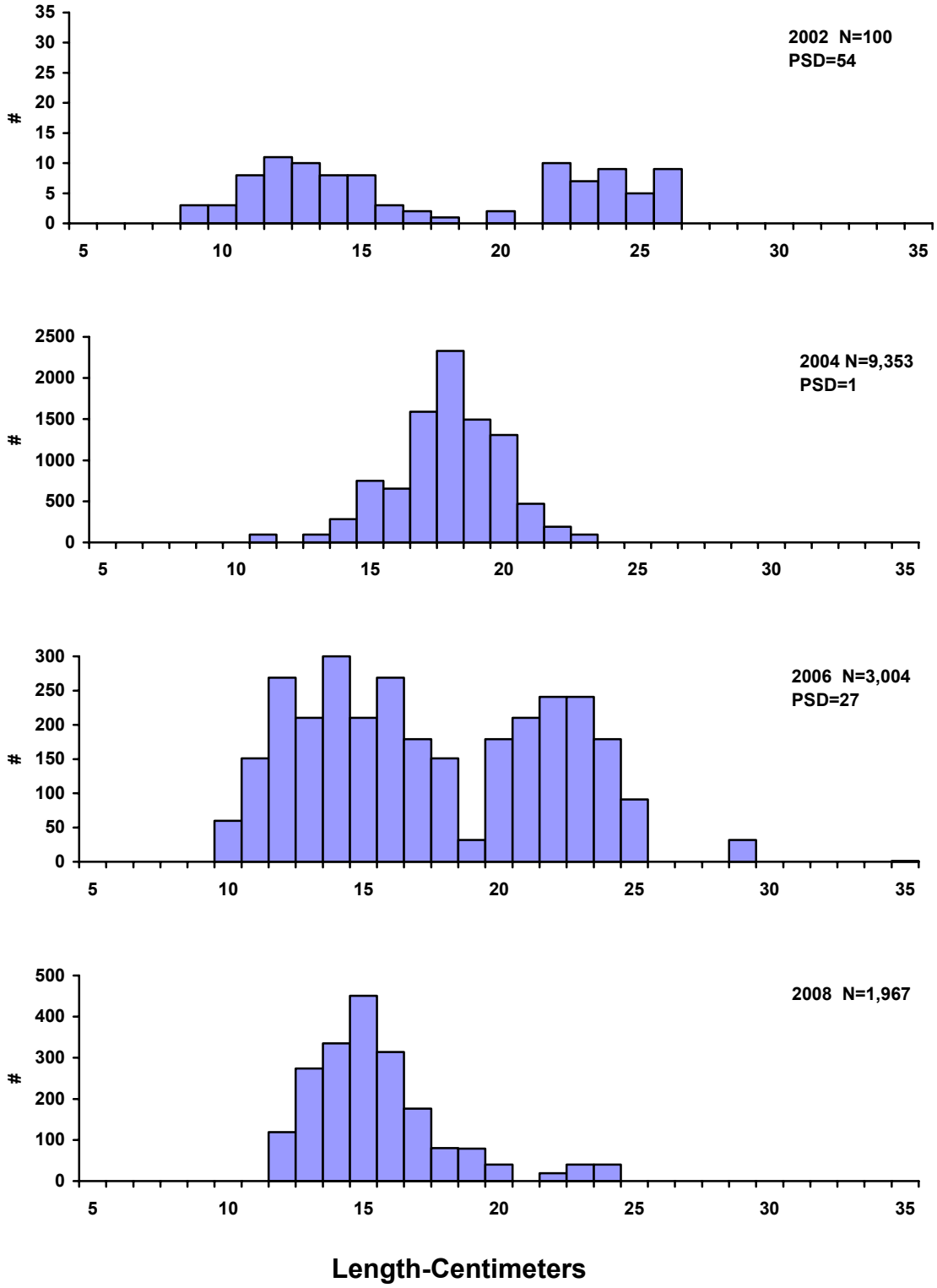

Figure 3. Length frequency histograms for black bullheads sampled with trap nets in West Oakwood Lake, Brookings County, 2002, 2004, 2006, and 2008.

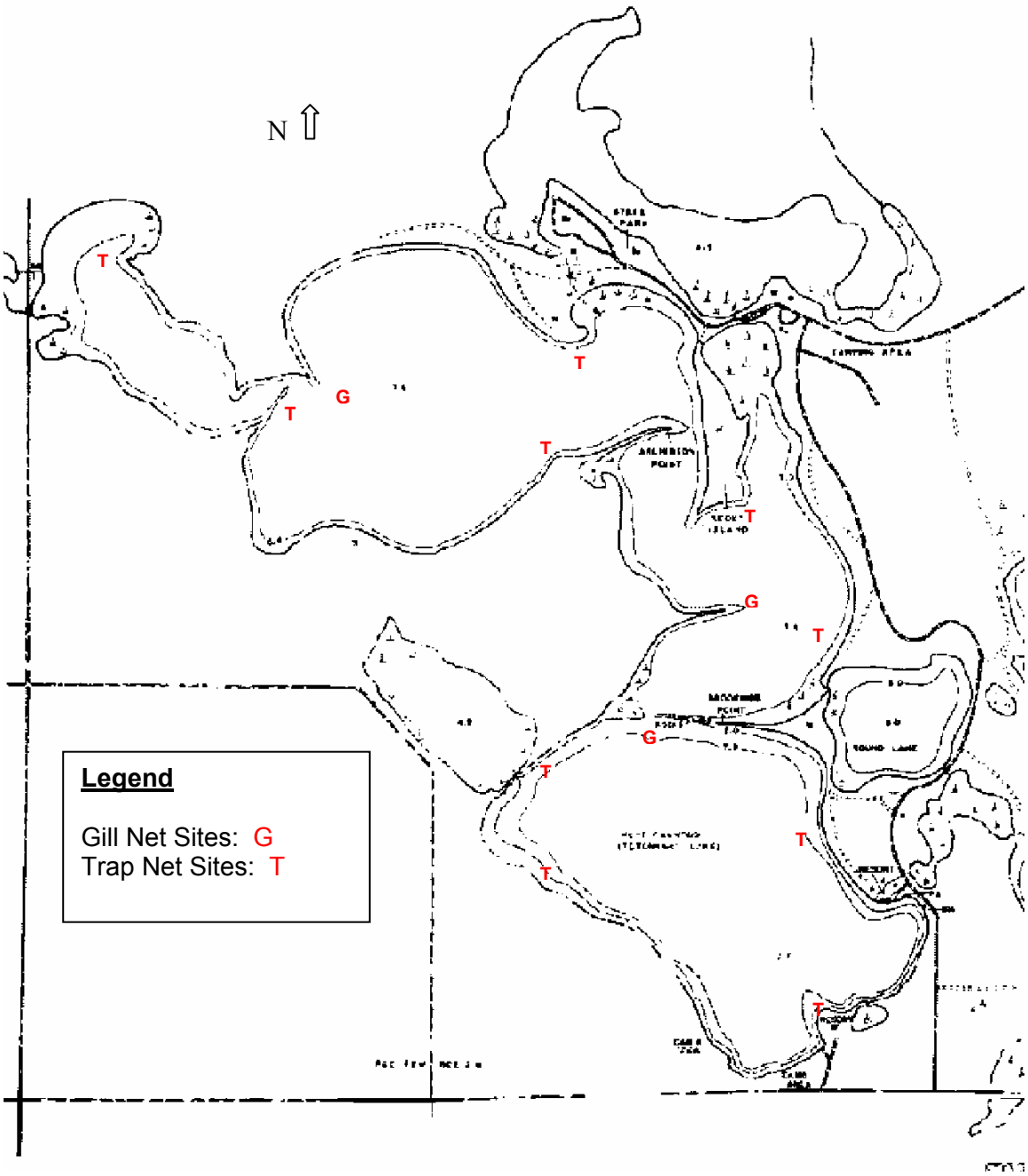

Figure 4. Sampling locations on West Oakwood Lake, Brookings County, 2008.

Appendix A. A brief explanation of catch per unit effort (CPUE), proportional stock density (PSD), relative stock density (RSD) and relative weight (Wr).

Catch Per Unit Effort (CPUE) is the catch of animals in numbers or in weight taken by a defined period of effort. Can refer to trap-net nights of effort, gill-net nights of effort, catch per hour of electrofishing, etc.

Proportional Stock Density (PSD) is calculated by the following formula:

$$PSD = \frac{\text{Number of fish} > \text{quality length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

Relative Stock Density (RSD-P) is calculated by the following formula:

$$RSD\text{-}P = \frac{\text{Number of fish} > \text{preferred length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

PSD and RSD-P are unitless and usually calculated to the nearest whole digit.

Size categories for selected species found in Region 3 lake surveys, in centimeters.

Species	Stock	Quality	Preferred	Memorable	Trophy
Walleye	25	38	51	63	76
Sauger	20	30	38	51	63
Yellow perch	13	20	25	30	38
Black crappie	13	20	25	30	38
White crappie	13	20	25	30	38
Bluegill	8	15	20	25	30
Largemouth bass	20	30	38	51	63
Smallmouth bass	18	28	35	43	51
Northern pike	35	53	71	86	112
Channel catfish	28	41	61	71	91
Black bullhead	15	23	30	38	46
Common carp	28	41	53	66	84
Bigmouth buffalo	28	41	53	66	84
Smallmouth buffalo	28	41	53	66	84

For most fish, 30-60 or 40-70 are typical objective ranges for “balanced” populations. Values less than the objective range indicate a population dominated by small fish while values greater than the objective range indicate a population comprised mainly of large fish.

Relative weight (Wr) is a condition index that quantifies fish condition (i.e., how much does a fish weigh for its length). A Wr range of 90-100 is a typical objective for most fish species. When mean Wr values are well below 100 for a size group, problems may exist in food and feeding relationships. When mean Wr values are well above 100 for a size group, fish may not be making the best use of available prey.